LANSCE

Kristin Bennett from the University of California, Berkeley, adjusts valves on the nitrogen cryostat on the neutron powder diffractometer at LANSCE. She is studying texture in shocked ice to understand how ice on Earth and in the outer solar system naturally deforms.

The Los Alamos Neutron Science Center (LANSCE), which comprises the Manuel Lujan Jr. Neutron Scattering Center and the Weapons Neutron Research facility at Los Alamos National Laboratory, produces pulsed beams of neutrons for experiments that support national security and civilian research.

Neutrons at LANSCE are produced by spallation when high-energy protons strike a tungsten target. LANSCE can provide world-class capabilities to carry out experiments designed to increase understanding of materials. Researchers also use these neutrons to better understand the science underlying aging nuclear weapon components, thus helping predict their safety and reliability without nuclear testing.

In collaboration with U.S. industry, researchers at LANSCE use neutrons to study materials such as polymers, catalysts, and structural composites that are essential for many modern industrial products.

LANSCE offers a range of instruments for probing the structure of materials, facilities for neutron irradiation, and spectrometers for addressing a variety of neutron-scattering issues as well as nuclear physics experiments such as parity violation and fission. There are 10 state-of-the-art instruments – including a powder diffractometer with a higher resolution than any other instrument of its type in the United States and a unique chopper spectrometer and reflectometer.

Scientists from universities use LANSCE facilities for experiments that contribute to a broad range of basic research in disciplines such as materials science, structural biology, solid-state and non-weapon nuclear physics, and chemistry. Many of these experiments are an integral part of the education and training of young American scientists.

Reliability is imperative to the success of an experiment, so LANSCE has begun improvements that will allow the facility to operate at least 85 percent of the time for 8 months a year.

LOS ALAMOS NEUTRON SCIENCE CENTER

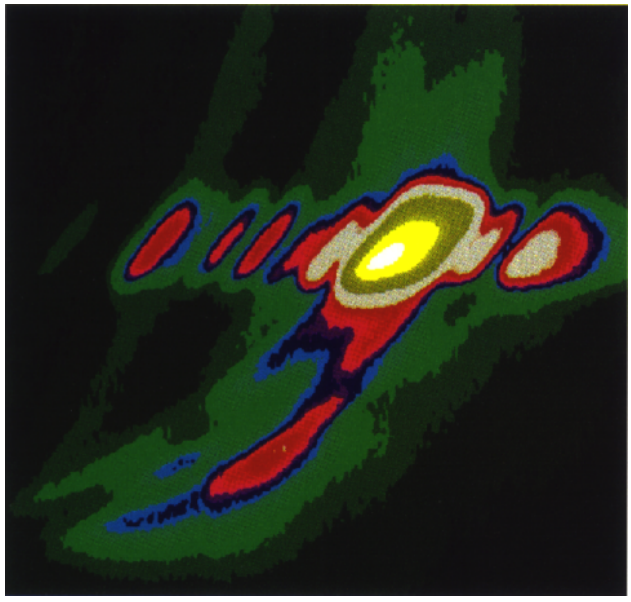
ACCOMPLISHMENTS

Using neutron reflectometry, scientists from The University of Patris (Greece), Harvey Mudd College (Claremont, California), and researchers from Los Alamos measured the structure of polymers subjected to shear flow, which is important for reducing friction in pipelines.

Proton irradiation research done at Los Alamos has led to improvement in the properties of high-temperature superconductors made by IBM Corporation.

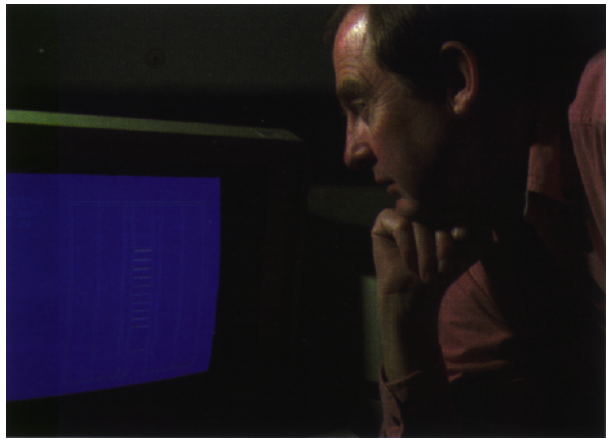
A refined understanding of the structure of carbon black contained in reinforced rubber by scientists from Los Alamos and the Sid Richardson Carbon Company may aid in improving the mechanical properties of tires.

Experiments by Los Alamos and Boston Biomedical Research Institute scientists determined the structure of the molecular switch that helps regulate muscle contraction.



Besides the mirror-like scattering, this neutron reflectometry data taken by scientists from Los Alamos National Laboratory and IBM's Almaden Research Center also exhibit diffuse scattering, which is characteristic of the rough surfaces between the polymer layers on a silicon wafer.

Gary Russell uses sophisticated Monte Carlo codes and high-speed computers as key tools to design spallation target systems.



Scientists from both Ford Motor Company and Rockwell International have separately used neutron powder diffraction to take strain measurements on composites to obtain information about their mechanical behavior, which leads to improvements in cars and planes.

Los Alamos and Boeing scientists have used neutron irradiation to verify the integrity of electronic systems in modern aircraft such as the Boeing 777.

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